Backgrounder

Development of Lists of Substances Proposed to be Prescribed under the Toxics Reduction Act, 2009: Toxic Substances and Substances of Concern

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1.0 Introduction

The *Toxics Reduction Act, 2009*, is the cornerstone of Ontario's Toxics Reduction Strategy (the Strategy). The goal of the Strategy is to help protect the health and environment of Ontarians by reducing toxic substances in air, land, water and consumer products while fostering the green economy. The Act requires regulated facilities to track and quantify the toxics that they use and create, to develop plans to reduce their toxics, and to make summaries of their plans available to the public. Information collected through the reporting requirements of the Act and proposed regulations would be made available to the public so that Ontarians can be aware of toxic substances being used and created around them, as well as the actions facilities are taking to reduce them.

The Act also requires facilities to report on their use of Substances of Concern that may be prescribed by regulation by the ministry. The Ministry will defer the proclamation of the sections in the *Toxics Reduction Act, 2009* related to Substances of Concern - Section 11 of the Act. The ministry intends to develop and consult on regulations related to substances of concern and substance of concern reports at a later date.

This document provides a description of how the ministry determined which substances would be proposed to be prescribed by regulation as toxics as well how the ministry proposes to identify substances of concern for any future regulatory action, further assessment or removal from the Strategy.

2.0 Lists of Substances under the Act

The Act references two different types of substances: 1) Toxic Substances and 2) Substances of Concern. For Toxic Substances prescribed by regulation, regulated owners and operators of manufacturing and mineral processing facilities would be required to track and quantify use and creation, develop plans to reduce, and share summaries of their plans with the public and make annual reports on their progress in implementing their plans. A number of Toxic Substances have been prioritized for initial implementation of proposed regulatory requirements in 2010 (Phase 1); these Phase 1 toxic substances (List of Priority Toxics) are listed in Table A of the proposed regulation. It is proposed that the remainder of the substances on the National Pollutant Release Inventory (NPRI) be prescribed as Toxic Substances for Phase 2 of the Strategy, with a proposed start date in 2012. Details regarding the proposed requirements for the Toxic Substances are the subject of public consultation on a draft regulation posted to the Environmental Registry (www.ebr.gov.on.ca (enter registry number 010-7792)).

Because less information is available on how the proposed Substances of Concern are being used in Ontario, the intent is that regulated owners and operators of manufacturing and mineral processing facilities would be required to report information on their use, creation and releases. Details regarding the proposed

contents of these reports are under development and will be set out in a separate (future) regulation.

2.1 Proposed Toxic Substances

As a starting point, the ministry has proposed that all substances listed on the National Pollutant Release Inventory (NPRI) plus acetone (Ontario Regulation 127/01: Airborne Contaminant Discharge Monitoring and Reporting Regulation) be subject to toxic substance accounting, toxics reduction planning and reporting requirements under the Act.

The NPRI is Canada's legislated and publicly accessible inventory of pollutant releases to the environment (air, water and land), disposals and transfers for recycling. It is analogous to the United States Environmental Protection Agency's (US EPA's) Toxics Release Inventory (TRI), and was used by Massachusetts and New Jersey to define substances subject to requirements under their Toxics Use Reduction Act and Pollution Prevention Act, respectively.

Each substance on the NPRI meets the following criteria: 1) is manufactured, processed or otherwise used in Canada; 2) is a health and/or environmental concern; 3) is released to the Canadian environment; and 4) is present in the Canadian environment. The national process for adding or deleting substances to NPRI was developed through consultations with Canadian stakeholders and, in particular, with the assistance of members of the Multi-stakeholder *Ad Hoc* Work Group on Substances (1998-2000), established in 1998. Through this process, a substance may be nominated for addition to or deletion from NPRI and consultations are carried out by Environment Canada and/or a multi-stakeholder group before a final decision is made. Additional information about NPRI criteria and modifications can be found in the 2001 Environment Canada document: *Modifying the National Pollutant Release Inventory. A Guide to the Procedures to Follow When Submitting Proposals and a Description of the Stakeholder Consultation Process* (http://www.ec.gc.ca/inrp-npri/52963259-62F9-4572-A3D4-5B52A9E091A2/2000_Modify-english-Final.pdf).

2.1.1 List of Priority Toxics - Phase One

In order to facilitate a phased approach to implementation, the ministry worked in consultation with the Minister's Toxics Reduction Scientific Expert Panel (Expert Panel) to develop a short list of toxics (List of Priority Toxics) to be included in the first phase of implementation. These substances are listed in Table A of the draft regulation. The ministry carried out four reviews, each of which provided a different perspective from which to consider substances to be prioritized. As a starting point, the ministry reviewed reported NPRI emissions (2006) and published hazard information to rank NPRI substances based on relative risk. Then, the rankings were refined to better reflect issues reported within MOE programs as well as priorities established by other agencies. These additional considerations aligned the ranked substances with existing programs and/or focus in current science. As part of its

commitment to address carcinogens in the Strategy, the ministry also reviewed NPRI (2006) to identify cancer-causing substances on NPRI that could be prioritized through the Strategy (Figure 1). Details of the four different reviews carried out are provided below.

Review 1 – Emissions and hazard (List A)

Ministry scientists reviewed the NPRI emissions data for all substances that were reported in Ontario in 2006. There were 165 substances with reported emissions to air and/or water in 2006. For each of these substances, emissions data and hazard information were combined to evaluate relative risk. Hazard information was derived from two different hazard scoring systems: 1) Risk Screening Environmental Indicators Inventory (RSEI) model; and 2) Scoring and Ranking System (SCRAM) for Persistent, Bioaccumulative, and Toxic substances for the North American Great Lakes. Both hazard scoring systems were used in order to rank substances based on both human health and environmental effects. RSEI scores were developed by the US EPA and reflect cancer and non-cancer human health endpoints. This scoring system was used for substances emitted to air and water (Appendix 1A). SCRAM was developed jointly by the Michigan Department of Environmental Quality, Surface Water Quality Division (SWQD), and Michigan State University, National Food Safety and Toxicology Centre and provides scores reflecting hazard to both human health and the environment. This scoring system was used for substances emitted to water (Appendix 1B).

Example A below illustrates the calculation of a hazard-emission score for arsenic and compounds. As shown in the example, the score for air emissions was calculated as total NPRI emission (air, Kg) x RSEI (inhalation) hazard score and the score for water emissions was calculated as total NPRI emission (water, Kg) x RSEI (ingestion) hazard score and/or NPRI emission (water, Kg) x SCRAM (cumulative) score.

In order to combine the hazard and emission scores generated using RSEI with those using SCRAM (which used a different scoring system), individual scores were converted to rankings. All ranked scores were then summed ((Rank for air emission X RSEI) + (Rank for water emission x RSEI) + (Rank for water emission x SCRAM)).

Example A: Emissions and Hazard Score for Arsenic and its compounds

Step 1) NPRI emissions to Air (Kg) = 31,144 (x) RSEI score 60,000 = 186,864, 000
(4th highest score out of 165 substances = rank of 162)

Step 2) NPRI emissions to Water (Kg) = 3739 (x) RSEI score 3,000 = 11, 217,000
(3rd highest score out of 165 substances = rank of 163)

Step 3) NPRI emissions to Water (Kg) = 3739 (x) SCRAM score 28 = 104,681
(6th highest score out of 165 substances = rank of 160)

Step 4) Sum of all ranks = 162+ 163+ 160 = 485 (total Emissions and Hazard score for arsenic)

It is important to note that RSEI and SCRAM scores were not available for every substance. For example, no RSEI or SCRAM scores were available for Criteria Air Contaminants (CACs) such as nitrogen oxide, particulate matter (PM2.5 and 10) and sulphur dioxide. Scores were available for selected volatile organic compounds (VOCs); however, no score existed for the substance group. In contrast, RSEI scores were available for polycyclic aromatic hydrocarbons (PAHs) as a group as well as for some individual PAHs. Details for all substances with hazard and emissions scores (List A) are provided in Appendix 2A.

Review 2 – MOE program relevance (List B)

Ministry experts and program leads on drinking water, air quality, source water and Brownfields were asked to identify substances of concern according to: 1) their experience; 2) occurrence in the Ontario environment; and/or 3) exceedance of a standard or guideline. Nominations were compiled into a second list of substances and used to refine the emissions and hazard scores on List A, by providing consideration of issues reported within MOE programs. Substances on List A received an additional 10% (from the total score of List A) if they were identified through the ministry programs review (List B, Appendix 2B). This step refined the results of the Review 1 ranking to be more reflective of issues reported within MOE programs.

Review 3 –Priorities of other programs or agencies (List C)

Emissions and hazard scores were also refined through a comparison to priority lists developed by academic, environmental non-government or government agencies in Ontario, Canada or other countries. Ministry staff carried out a review of over 1500 substances on 27 different priority lists. This review provided a lens of current science and significance according to other programs and was intended to inform future reviews of substances under the Strategy. The lists reviewed by the ministry ranged broadly in scope and purpose, including targeted lists of chemicals for virtual elimination to substances included in literature reviews or biomonitoring studies. In order to screen these substances for those of most consistent concern across jurisdictions or program areas, the ministry applied a scoring system to the lists, according to the aggressiveness of the program. For example, lists of substances for virtual elimination received a score of 5 while emissions tracking inventories like NPRI received a score of 2 and literature reviews were scored as 1. Further details on the lists of substances reviewed and their scores are provided in Appendix 2C.

The score for each substance was summed according to its presence on all lists. Substances that were identified by multiple programs tended to rank higher than those substances identified by only one or a few programs and the top 10% (155 substances) were selected to reflect priorities in different jurisdictions and current science. An additional 20% was added to the combined total scores from reviews 1 and 2 if a substance was also identified in the top 10% of the substances screened through this review (Appendix 2C).

The final ranking for lists A, B and C considered only PAHs as a group to eliminate duplication. The top ranking substances based on reviews 1 through 3 can be found in Appendix 2D.

Review 4 – Carcinogens (List D)

The ministry reviewed carcinogens identified in the Cancer and the Environment Stakeholder Group's 2007 document *Cancer and the Environment in Ontario: Gap Analysis on the Reduction of Environmental Carcinogens* (http://www.cela.ca/files/uploads/593gap__analysis.pdf). Carcinogens were identified of interest to the Strategy if they were: 1) classified by the International Agency for Research on Cancer (IARC) as known or probable carcinogens or by the National Toxicology Program (NTP) as known carcinogens; 2) identified by a Chemical Abstract Service (CAS) number; and 3) tracked on NPRI (2006). In total, 24 substances were identified through this review. Eleven of these substances were already identified as priorities through reviews 1-3 and the remaining 13 were added to the List of Priority Toxics (Appendix 2E).

Final List of Priority Toxics

The final List of Priority Toxics is provided in Table 1, which includes 47 substances or substance groups. The ministry's 2008 Discussion Paper on the Toxics Reduction Strategy (http://www.ene.gov.on.ca/envision/env_reg/er/documents/2008/010-4374.pdf) identified 45 of these substances. In 2009, an additional two substances, acetaldehyde and antimony and compounds, were added after the ministry discovered and corrected a technical error in the ranking process. Additionally, the list of 47 substances and substance groups reflect the 2008 NPRI list of substances which includes additional individual substances in the PAH and dioxin and furan groupings. The list is comprised of the top ranking (i.e., score of at least 250) 34 substances according to reviews 1 through 3 and the remaining carcinogens identified through review 4.

Figure 1: Review Process to Prioritize Substances (Phase 1 Priority Toxics)

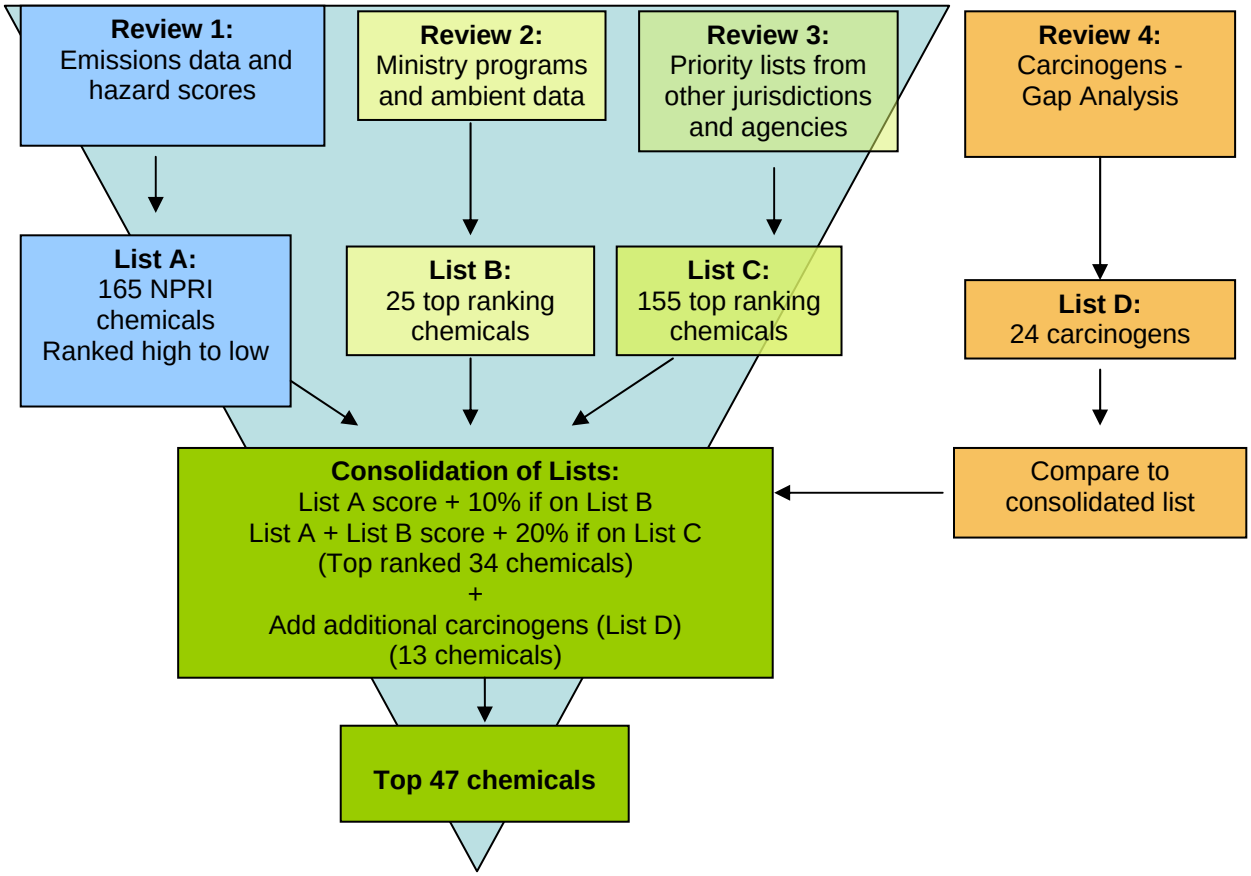


Table1: List of Priority Toxic Substances as proposed in Table A of the Draft Regulation posted on the Environmental Registry

Item	Column 1	Column 2	Column 3
	Toxic Substance	**CAS#**	**NPRI Part**
1	Acetaldehyde	75-07-0	1
2	Acrylamide	79-06-1	1
3	Aluminum[1]	7429-90-5	1
4	Antimony[2]	**	1
5	Arsenic[3]	**	1
6	Asbestos[4]	1332-21-4	1
7	Benzene	71-43-2	1,5
8	Biphenyl	92-52-4	1
9	1,3 –Butadiene	106-99-0	1,5
10	Cadmium[5]	**	1
11a	Benzoyl chloride	98-88-4	1
11b	Benzyl chloride	100-44-7	1
12	Chlorine	7782-50-5	1
13	Chromium[6]	**	1
14	Cobalt[7]	**	1
15	Copper[8]	**	1
16	Creosote	8001-58-9	5
17	Cyanides[9]	**	1
18	1,2-Dichloroethane	107-06-2	1,5
19a	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	3
19b	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	3
19c	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	3
19d	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	3
19e	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	3
19f	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	3
19g	Octachlorodibenzo-p-dioxin	3268-87-9	3
19h	2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	3
19i	2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	3
19j	1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	3
19k	1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	3
19l	1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	3
19m	1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	3
19n	2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	3
19o	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	3
19p	1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	3
19q	Octachlorodibenzofuran	39001-02-0	3
20	Epichlorohydrin	106-89-8	1
21	Ethylbenzene	100-41-4	1
22	Ethylene Oxide	75-21-8	1

Item	Column 1	Column 2	Column 3
23	Formaldehyde	50-00-0	1,5
24	Hexachlorobenzene	118-74-1	3
25	Hexavalent Chromium compounds	**	1
26	Hydrochloric acid	7647-01-0	1
27	Lead[10,11]	**	1
28	Manganese[12]	**	1
29	Mercury[13]	**	1,2
30	Methanol	67-56-1	1,5
31	Nickel[14]	**	1
32	Phenol[15]	108-95-2	1
33	p,p'-methylenebis (2-chloroaniline)	101-14-4	1
34	Selenium[16]	**	1
35	Silver[17]	**	1
36	Styrene Oxide	96-09-3	1
37a	Sulphuric acid	7664-93-9	1
37b	Dimethyl sulphate	77-78-1	1
37c	Diethyl sulphate	64-67-5	1
38	Tetrachloroethylene	127-18-4	1
39	Thorium Dioxide	1314-20-1	1
40	Toluene	108-88-3	1,5
41a	Acenaphthene	83-32-9	2
41b	Acenaphthylene	208-96-8	2
41c	Anthracene	120-12-7	1
41d	Benzo(a)anthracene	56-55-3	2
41e	Benzo(a)phenanthrene	218-01-9	2
41f	Benzo(a)pyrene	50-32-8	2
41g	Benzo(b)fluoranthene	205-99-2	2
41h	Benzo(e)pyrene	192-97-2	2
41i	Benzo(g,h,i)perylene	191-24-2	2
41j	Benzo(j)fluoranthene	205-82-3	2
41k	Benzo(k)fluoranthene	207-08-9	2
41l	Dibenzo(a,j)acridine	224-42-0	2
41m	Dibenzo(a,h)acridine	226-36-8	2
41n	Dibenzo(a,h)anthracene	53-70-3	2
41o	Dibenzo(a,e)fluoranthene	5385-75-1	2
41p	Dibenzo(a,e)pyrene	192-65-4	2
41q	Dibenzo(a,h)pyrene	189-64-0	2
41r	Dibenzo(a,i)pyrene	189-55-9	2
41s	Dibenzo(a,1)pyrene	191-30-0	2
41t	7H-Dibenzo(c,g)carbazole	194-59-2	2
41u	7,12-Dimethylbenz(a)anthracene	57-97-6	2
41v	Fluoranthene	206-44-0	2

Item	Column 1	Column 2	Column 3
41w	Fluorene	86-73-7	2
41x	Indeno(1,2,3-c,d)pyrene	193-39-5	2
41y	3-Methylcholanthrene	56-49-5	2
41z	5-Methylchrysene	3697-24-3	2
41aa	Naphthalene	91-20-3	1
41ab	1-Nitropyrene	5522-43-0	2
41ac	Perylene	198-55-0	2
41ad	Phenanthrene	85-01-8	2
41ae	Pyrene	129-00-0	2
42	Trichloroethylene	79-01-6	1
43	Triethylamine	121-44-8	1
44	Vanadium[18]	7440-62-2	1
45	Vinyl Chloride	75-01-4	1
46	Xylene[19]	1330-20-7	1, 5
47	Zinc[20]	**	1

** no single CAS number applies to this substance
[1] fume or dust
[2] and its compounds
[3] and its compounds
[4] friable form
[5] and its compounds
[6] and its compounds, except hexavalent chromium compounds
[7] and its compounds
[8] and its compounds
[9] ionic
[10] and its compounds, except tetraethyl lead (CAS No. 78-00-2)
[11] does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys.
[12] and its compounds
[13] and its compounds
[14] and its compounds
[15] and its salts. The CAS Number corresponds to the weak acid or base. However, this substance includes the salts of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular weight of the acid or base, not the total weight of the salt.
[16] and its compounds
[17] and its compounds
[18] (except when in an alloy) and its compounds
[19] all isomers, including the individual isomers of xylene: m-xylene (CAS No. 108-38-3), o-xylene (CAS No. 95-47-6) and p-xylene (CAS No. 106-42-3)
[20] and its compounds

NOTE: A footnote that qualifies the listing of a toxic substance in this Table is the same footnote that qualifies its listing in Schedule 1 to the NPRI Notice.

2.1.2 Phase 2 (Proposed to be subject to EBR consultation in 2010)

The remaining NPRI (2008) substances plus acetone (O. Reg. 127/01) are proposed to be prescribed under phase 2 of the Strategy (Table 2). Initially this list would comprise a total of approximately 250 substances and would be subject to all legislative requirements in the second phase.

Table 2: Phase 2 Toxics (based on NPRI 2008 and O.Reg 127/01)

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
1,1- Methylene*bis* (4-isocyanatocyclohexane)	5124-30-1	1
1,1,1,2-Tetrachloroethane	630-20-6	1
1,1,2,2-Tetrachloroethane	79-34-5	1
1,1,2-Trichloroethane	79-00-5	1
1,2,4-Trichlorobenzene	120-82-1	1
1,2,4-Trimethylbenzene	95-63-6	1,5
1,2-Butylene oxide	106-88-7	1
1,2-Dichloropropane	78-87-5	1
1,4-Dioxane	123-91-1	1
1-Bromo-2-chloroethane	107-04-0	1
2,2, 4-Trimethylhexamethylene diisocyanate	16938-22-0	1
2,4, 4-Trimethylhexamethylene diisocyanate	15646-96-5	1
2,4-Diaminotoluene (and its salts)	95-80-7	1
2,4-Dichlorophenol (and its salts)	120-83-2	1
2,4-Dinitrotoluene	121-14-2	1
2,6-Dinitrotoluene	606-20-2	1
2,6-Di-*t*-butyl-4-methylphenol	128-37-0	1
2-Butoxyethanol	111-76-2	1,5
2-Ethoxyethanol	110-80-5	1
2-Ethoxyethyl acetate	111-15-9	1
2-Mercaptobenzothiazole	149-30-4	1
2-Methoxyethanol	109-86-4	1
2-Methoxyethyl acetate	110-49-6	1
2-Methyl-3-hexanone	7379-12-6	5
2-Methylpyridine	109-06-8	1
2-Nitropropane	79-46-9	1
3,3'-Dichlorobenzidine dihydrochloride	612-83-9	1
3-Chloro-2-methyl-1-propene	563-47-3	1
3-Chloropropionitrile	542-76-7	1
4,6-Dinitro-*o*-cresol (and its salts)	534-52-1	1
Acetonitrile	75-05-8	1
Acetophenone	98-86-2	1
Acetone	67-64-1	
Acetylene	74-86-2	5
Acrolein	107-02-8	1
Acrylic acid (and its salts)	79-10-7	1
Acrylonitrile	107-13-1	1
Adipic acid	124-04-9	5
Alkanes, C10-13, chloro	85535-84-8	1
Alkanes, C6-18, chloro	68920-70-7	1
Allyl alcohol	107-18-6	1
Allyl chloride	107-05-1	1
alpha-Pinene	80-56-8	5
Aluminum oxide (fibrous form)	1344-28-1	1
Ammonia (total)	*	1

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
Aniline (and its salts)	62-53-3	1,5
Anthraquinone (all isomers)	*	5
Benzoyl peroxide	94-36-0	1
beta-Phellandrene	555-10-2	5
beta-Pinene	127-91-3	5
Bis(2-ethylhexyl) *adipate*	103-23-1	1
Bis(2-ethylhexyl) *phthalate*	117-81-7	1
Boron trifluoride	7637-07-2	1
Bromine	7726-95-6	1
Bromomethane	74-83-9	1
Butane (all isomers)	*	5
Butene (all isomers)	25167-67-3	5
Butyl acrylate	141-32-2	1
Butyl benzyl phthalate	85-68-7	1
Butyraldehyde	123-72-8	1
C.I. Acid Green 3	4680-78-8	1
C.I. Basic Green 4	569-64-2	1
C.I. Basic Red 1	989-38-8	1
C.I. Direct Blue 218	28407-37-6	1
C.I. Disperse Yellow 3	2832-40-8	1
C.I. Food Red 15	81-88-9	1
C.I. Solvent Orange 7	3118-97-6	1
C.I. Solvent Yellow 14	842-07-9	1
Calcium cyanamide	156-62-7	1
Calcium fluoride	7789-75-5	1
Carbon disulphide	75-15-0	1
Carbon monoxide	630-08-0	4
Carbon tetrachloride	56-23-5	1
Carbonyl sulphide	463-58-1	1
Catechol	120-80-9	1
CFC-11	75-69-4	1
CFC-114	76-14-2	1
CFC-115	76-15-3	1
CFC-12	75-71-8	1
CFC-13	75-72-9	1
Chlorendic acid	115-28-6	1
Chlorine dioxide	10049-04-4	1
Chloroacetic acid (and its salts)	79-11-8	1
Chlorobenzene	108-90-7	1,5
Chloroethane	75-00-3	1
Chloroform	67-66-3	1
Chloromethane	74-87-3	1
Cresol (all isomers and their salts)	1319-77-3	1
Crotonaldehyde	4170-30-3	1
Cumene	98-82-8	1
Cumene hydroperoxide	80-15-9	1
Cycloheptane (all isomers)	*	5

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
Cyclohexane	110-82-7	1
Cyclohexanol	108-93-0	1
Cyclohexene (all isomers)	*	5
Cyclooctane (all isomers)	*	5
Decabromodiphenyl oxide	1163-19-5	1
Decane (all isomers)	*	5
Dibutyl phthalate	84-74-2	1
Dichloromethane	75-09-2	1
Dicyclopentadiene	77-73-6	1
Diethanolamine (and its salts)	111-42-2	1
Diethyl phthalate	84-66-2	1
Diethylene glycol butyl ether	112-34-5	5
Diethylene glycol ethyl ether acetate	112-15-2	5
Dihydronapthalene (all isomers)	*	5
Dimethyl phenol	1300-71-6	1
Dimethyl phthalate	131-11-3	1
Dimethylamine	124-40-3	1
Dimethylether	115-10-6	5
Dinitrotoluene (mixed isomers)	25321-14-6	1
Di-*n*-octyl phthalate	117-84-0	1
Diphenylamine	122-39-4	1
D-Limonene	5989-27-5	5
Dodecane (all isomers)	*	5
Ethyl acetate	141-78-6	5
Ethyl acrylate	140-88-5	1
Ethyl alcohol	64-17-5	5
Ethyl chloroformate	541-41-3	1
Ethylene	74-85-1	1,5
Ethylene glycol	107-21-1	1
Ethylene glycol butyl ether acetate	112-07-2	5
Ethylene glycol hexyl ether	112-25-4	5
Ethylene thiourea	96-45-7	1
Fluorine	7782-41-4	1
Formic acid	64-18-6	1
Furfuryl alcohol	98-00-0	5
Halon 1211	353-59-3	1
Halon 1301	75-63-8	1
HCFC 124 (and all isomers)	63938-10-3	1
HCFC-122 (and all isomers)	41834-16-6	1
HCFC-123 (and all isomers)	34077-87-7	1
HCFC-141b	1717-00-6	1
HCFC-142b	75-68-3	1
HCFC-22	75-45-6	1
Heavy alkylate naptha	64741-65-7	5
Heavy aromatic solvent naphtha	64742-94-5	5
Heptane (all isomers)	*	5
Hexachlorocyclopentadiene	77-47-4	1

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
Hexachloroethane	67-72-1	1
Hexachlorophene	70-30-4	1
Hexane (all isomers) excluding *n*-hexane	*	5
Hexene (all isomers)	25264-93-1	5
Hydrazine (and its salts)	302-01-2	1
Hydrogen cyanide	74-90-8	1
Hydrogen fluoride	7664-39-3	1
Hydrogen sulphide	7783-06-4	1
Hydroquinone (and its salts)	123-31-9	1
Hydrotreated heavy naptha	64742-48-9	5
Hydrotreated light distillate	64742-47-8	5
i-Butyl alcohol	78-83-1	1
Iron pentacarbonyl	13463-40-6	1
Isobutyraldehyde	78-84-2	1
Isophorone diisocyanate	4098-71-9	1
Isoprene	78-79-5	1
Isopropyl alcohol	67-63-0	1,5
Isosafrole	120-58-1	1
Light aromatic solvent naphtha	64742-95-6	5
Lithium carbonate	554-13-2	1
Maleic anhydride	108-31-6	1
Methyl acrylate	96-33-3	1
Methyl ethyl ketone	78-93-3	1,5
Methyl iodide	74-88-4	1
Methyl isobutyl ketone	108-10-1	1,5
Methyl methacrylate	80-62-6	1
Methyl *tert*-butyl ether	1634-04-4	1
Methylene*bis*(phenylisocyanate)	101-68-8	1
Methylindan (all isomers)	27133-93-3	5
Michler's ketone (and its salts)	90-94-8	1
Mineral spirits	64475-85-0	5
Molybdenum trioxide	1313-27-5	1
Myrcene	123-35-3	5
N,N-Dimethylaniline (and its salts)	121-69-7	1
N,N-Dimethylformamide	68-12-2	1
Naphtha	8030-30-6	5
n-Butyl acetate	123-86-4	5
n-Butyl alcohol	71-36-3	1
n-Hexane	110-54-3	1,5
Nitrate ion (in solution at a pH of 6.0 or greater)	*	1
Nitric acid	7697-37-2	1
Nitrilotriacetic acid (and its salts)	139-13-9	1
Nitrobenzene	98-95-3	1
Nitroglycerin	55-63-0	1
N-Methyl-2-pyrrolidone	872-50-4	1
N-Methylolacrylamide	924-42-5	1
N-Nitrosodiphenylamine	86-30-6	1

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
Nonane (all isomers)	*	5
Nonylphenol and its ethoxylates	*	1
Octane (all isomers)	*	5
Octylphenol and its ethoxylates	*	1
o-Dichlorobenzene	95-50-1	1
o-Phenylphenol (and its salts)	90-43-7	1
Oxides of nitrogen (expressed as NO_2)	11104-93-1	4
p,p'-Isopropylidenediphenol	80-05-7	1
p,p'-Methylenedianiline	101-77-9	1
Paraldehyde	123-63-7	1
p-Dichlorobenzene	106-46-7	1,5
Pentachloroethane	76-01-7	1
Pentane (all isomers)	*	5
Pentene (all isomers)	*	5
Peracetic acid (and its salts)	79-21-0	1
Phenyl isocyanate	103-71-9	5
Phosgene	75-44-5	1
Phosphorus (total)	*	1
Phosphorus (yellow or white)	7723-14-0	1
Phthalic anhydride	85-44-9	1
PM - Total Particulate Matter <= 100 Microns	*	4
PM_{10} - Particulate Matter <= 10 Microns	*	4
$PM_{2.5}$ – Particulate Matter <= 2.5 Microns	*	4
p-Nitroaniline	100-01-6	1
p-Nitrophenol (and its salts)	100-02-7	1
Polymeric diphenylmethane diisocyanate	9016-87-9	1
Potassium bromate	7758-01-2	1
p-Phenylenediamine (and its salts)	106-50-3	1
p-Quinone	106-51-4	1
Propane	74-98-6	5
Propargyl alcohol	107-19-7	1
Propionaldehyde	123-38-6	1
Propylene	115-07-1	1,5
Propylene glycol butyl ether	5131-66-8	5
Propylene glycol methyl ether acetate	108-65-6	5
Propylene oxide	75-56-9	1
Pyridine (and its salts)	110-86-1	1
Quinoline (and its salts)	91-22-5	1
Safrole	94-59-7	1
sec-Butyl alcohol	78-92-2	1
Sodium fluoride	7681-49-4	1
Sodium nitrite	7632-00-0	1
Solvent naptha light aliphatic	64742-89-8	5
Solvent naptha medium aliphatic	64742-88-7	5
Stoddard solvent	8052-41-3	5
Styrene	100-42-5	1,5

Individual Substances	Chemical Abstract Service Number (CAS#)	NPRI Part
Sulphur dioxide	7446-09-5	4
Sulphur hexafluoride	2551-62-4	1
Terpenes (all isomers)	68956-56-9	5
tert-Butyl alcohol	75-65-0	1
Tetracycline hydrochloride	64-75-5	1
Tetraethyl lead	78-00-2	1
Tetrahydrofuran	109-99-9	5
Thiourea	62-56-6	1
Titanium tetrachloride	7550-45-0	1
Toluene-2,4-diisocyanate	584-84-9	1
Toluene-2,6-diisocyanate	91-08-7	1
Toluenediisocyanate (mixed isomers)	26471-62-5	1
Total reduced sulphur	*	1
Trimethylbenzene (all isomers) excluding 1,2,4-trimethylbenzene	25551-13-7	5
Trimethylfluorosilane	420-56-4	5
Vinyl acetate	108-05-4	1,5
Vinylidene chloride	75-35-4	1
VM & P naptha	8032-32-4	5
Volatile Organic Compounds (VOCs)	*	4
White mineral oil	8042-47-5	5

2.2 Proposed Substances of Concern

Less information regarding exposure and/or emissions is available for substances that are not tracked through NPRI. To better understand use and emissions in Ontario, Ministry staff, in collaboration with a sub-group of the Expert Panel, developed an initial list of 19 non-NPRI substances as Substances of Concern proposed to be subject to new reporting requirements in Ontario. Information that would be collected as a result of any new requirements would allow the ministry to enhance knowledge regarding substances of potential concern in Ontario and contribute to both federal and provincial commitments under the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem and the federal Chemicals Management Plan.

The Ministry will defer the proclamation of the sections in the *Toxics Reduction Act, 2009* related to Substances of Concern – Section 11 of the Act. It is proposed that regulations will be developed at a later date to provide detail on the requirements related to Substances of Concern and substance of concern reports.

2.2.1 Substance Groups Screened

Substances were screened from three general sources for the purpose of identifying a proposed the List of Substances of Concern (which would need to be prescribed in

regulation to come into effect) (Figure 2; details in Appendix 3A). These included inventories selected by the ministry and the Expert Panel sub-group and reported in the ministry's 2008 Discussion Paper (Group 1). Additionally, the ministry and Expert Panel sub-group reviewed a scientific publication identifying over 600 persistent, bioaccumulative and toxic chemicals of relevance to the Great Lakes Basin (Group 2) and responded to comments during the 2008 consultation by including consideration of chemicals prioritized by the federal government under its Chemicals Management Plan (CMP) (Group 3). The inclusion of the two additional data sources increased the number of substances considered for development of the proposed List of Substances of Concern compared to the 2008 Discussion Paper. These were considered appropriate inventories for identifying substances of concern because they represent substances that are regionally relevant for Ontario, and/or have toxicological endpoints of concern to human health and/or the environment. Details on the three groupings are as follows:

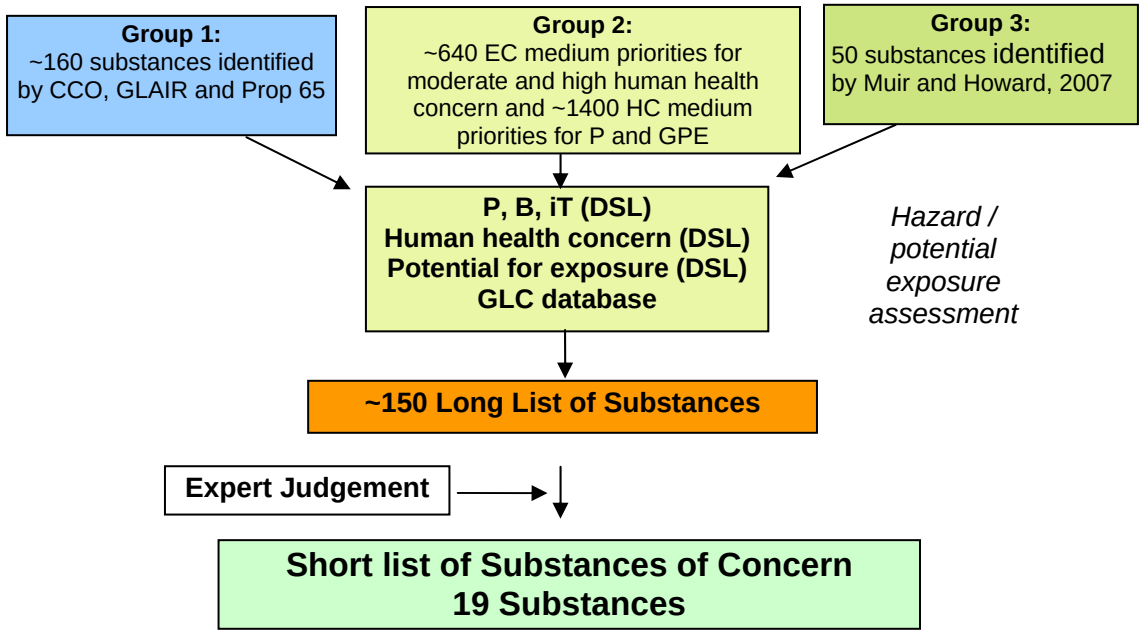
Group 1: Inventories cited in the ministry's 2008 Discussion Paper: 1) *Environment in Ontario: Gap Analysis on the Reduction of Environmental Carcinogens;* 2) The Great Lakes Toxic Air Emissions Inventory; and 3) a subset of California's Proposition 65. These inventories represent a list of over 400 substances that are carcinogens, reproductive or developmental toxicants or air contaminants of concern in the Great Lakes Basin.

Group 2: Priorities identified by a review of persistent, bioaccumulative and toxic substances relevant to Great Lakes research (from Muir and Howard (2007) report: *Developing analytical methodology for PB&T substances – a systematic process for identification of important chemicals;* initial findings published *by Muir and Howard (2006) "Are There Other Persistent Organic Pollutants? A Challenge for Environmental Chemists*" Environmental Science and Technology (40) pp 7157-7166). The authors screened the US EPA Toxic Substances Control Act (TSCA) and the Canadian Domestic Substances List (DSL) to: (1) identify emerging contaminants and persistent, bioaccumulative, and toxic (PBT) chemicals that were not being considered in current Great Lakes contaminant measurement programs; and (2) determine how they could be chemically analyzed. A total of 600 chemicals were considered for a short list of 50 substances. The short list was considered as part of the ministry's screening process.

Group 3: Substances identified by Environment Canada or Health Canada as medium priorities for assessment under the federal Chemicals Management Plan (CMP). The CMP is the result of the review and categorization of the existing 23,000 substances on the DSL (http://www.ec.gc.ca/CEPARegistry/subs_list_/DSLsearch.cfm). The federal government reviewed substances according to their persistence (P), potential for bioaccumulation (B), inherent toxicity to aquatic life (iTaq), concern to human health (HH) or having the greatest potential for human exposure (GPE). This systematic review resulted in substances being categorized as high, medium or low priority for follow up by screening level risk assessment. The ministry omitted substances identified as high priority since these substances are the focus of the

current federal Challenge Program. Instead, the ministry focused on a list of medium priority substances provided by the federal government, which will be the subject of assessment in the future.

Figure 2: Process for Developing the Proposed Substances of Concern List



2.2.2 Screening Criteria

All substances from the three different groups were screened through the ministry's Ground Level Concentration (GLC) database to determine the potential presence, use and/or emissions in Ontario. The GLC database is a record of over three thousand toxicological reviews carried out by the ministry. These reviews are conducted as part of an application by industry for a Certificate of Approval to emit a substance in Ontario. Any substance in this database has been used or emitted in Ontario.

The ministry screened the substances from Groups 1, 2 and 3 by utilizing the federal government's DSL categorization data. Since most substances in the three groups met at least one of the DSL criteria, combinations of criteria were used to select substances of specific concern to the Strategy. Table 3 provides the different criteria combinations that substances were screened against. The combinations of criteria included concerns to both the environment and human health. The three groups of substances were screened using one or more of five different criteria combinations, depending on the nature of the substance group.

Groups 1 and 2: These substances included a wide range of programs and were screened to select a subset using five different combinations of criteria: 1) persistent, inherently toxic to aquatic life and bioaccumulative; 2) persistent, inherently toxic to aquatic life and of concern to human health; 3) bioaccumulative, inherently toxic to aquatic life and of concern to human health; 4) persistent in the environment, of human health concern and with the greatest potential for human exposure; or 5) inherently toxic to aquatic life and of concern to human health.

Group 3: Health Canada medium priority substances were screened to select a subset that are: 1) persistent in the environment, of concern to human health and with the greatest potential for human exposure; or 2) inherently toxic to aquatic life and of concern to human health. Environment Canada medium priority substances were screened to select a subset that are: 1) persistent and inherently toxic to aquatic life and of concern to human health or 2) bioaccumulative and inherently toxic to aquatic life and of concern to human health.

Table 3: Screening Criteria used to Prioritize Substances of Concern

Inventory	DSL Categorization Criteria				
	P	**B**	**iTaq**	**GPE**	**HH concern**
Group 1: GLAIR + Prop 65 + CCO (n ~400)	x	x	x		
and	x		x		X
Group 3: Muir and Howard (n ~ 50)		x	x		X
	x			x	X
			x		X
Group 2: Environment Canada DSL medium priorities (n~1440)	x		x		X
		x	x		X
Group 2: Health Canada DSL medium priorities (n ~640)	x			x	X
			x		X

P=persistence; B=bioaccumulation; iTaq=inherent toxicity to aquatic organisms; GPE=greatest potential for human exposure; HH concern=human health concern.
DSL=Domestic Substances List
GLAIR = Great Lakes Toxic Air Emissions Inventory
Prop 65 = State of California's *Safe Drinking Water and Toxic Enforcement Act*, 1986 (California's Proposition 65).
CCO = Environment in Ontario: Gap Analysis on the Reduction of Environmental Carcinogens.

2.2.3 Expert Judgement

Screening by the above criteria provided a list of approximately 150 substances. To obtain a short list of approximately 20 substances, ministry scientists and members of the Expert Panel sub-group reviewed readily available information on each substance including: toxicity, physical and chemical characteristics and potential uses. Three

groups of compounds that were removed during this step were metal compounds, polymers and agricultural pesticides. Metal compounds are already reported as the individual metals through NPRI and polymers posed challenges for assessment due to their properties (molecular weight of the individual polymer, particle sizes, the individual monomers which make up the polymer and residual monomer content). These compounds may be considered in future reviews by the ministry. In total, 19 substances were identified for the final list of proposed Substances of concern (Table 4).

Table 4: List of Proposed Substances of Concern

Substance	CAS #
C.I. Pigment Yellow 36	37300-23-5
Benzene, C10-16-alkyl derivatives	68648-87-3
Triethanolamine	102-71-6
Dicumylperoxide	80-43-3
Carbendazim	10605-21-7
Benzotriazole	25973-55-1
Di-isodecyl phthalate (DIDP)	26761-40-0
Hexachloro-1,3-butadiene	87-68-3
Barium lithol red	1103-38-4
D&C red no. 9	5160-02-1
2,6-di-tert-butylphenol	128-39-2
Pentachlorothiophenol	133-49-3
1,2,3,4-Tetrachlorobenzene	634-66-2
2-Bromopropane	75-26-3
3,3'-Dimethylbenzidine	119-93-7
Dichloroethane, 1,1-	75-34-3
3,3'-dimethyoxybenzidine	119-90-4
4,4'-methylene bis(o-ethylaniline)	19900-65-3
Tricresyl phosphate	1330-78-5

The following example illustrates how substances were screened by the ministry and Expert Panel sub-group (Example B).

Example B: Triethanolamine (CAS# 102-71-6)
(IUPAC name: 2,2',2''-nitrilotriethanol; also known as triethylolamine, or TEA)

Step 1) DSL categorization.
Triethanolamine was identified by Health Canada as a medium priority for assessment under the CMP and was included in Group 2. This substance was added to the long list of ~150 as it met the screening criteria of being persistent in the environment, of moderate Human Health concern and having the greatest potential for human exposure.

Step 2) GLC database.
The ministry first reviewed a GLC for triethanlolamine in 1990 and last reviewed the substance in 2006. Over 40 different facilities applied to the ministry to emit this substance during this time period.

The substance is believed to have a wide variety of uses which include in the production of emulsifiers and detergents, to accelerate concrete drying and as a grinding aid in the manufacture of cement. It is also used in various cosmetics products including lipstick and in the manufacture of textile specialties, waxes, polishes, herbicides, petroleum demulsifiers, toilet goods, cutting oils, in making mineral & vegetable oil emulsions, solvents and pharmaceutical aids (alkalizer).

Step 3) Expert Judgement

Based on the categorization under the DSL and the likely use in Ontario, TEA was identified as a substance for which additional information would be warranted in Ontario.

The information gathered on the Substances of Concern in Ontario would allow the ministry to determine whether management under the Strategy or another ministry program is appropriate. For example, a substance may be a good candidate for regulatory action or for non-regulatory technical assistance or green chemistry promotion within the Strategy. Alternatively, the substance may be referred to another ministry program outside of the Strategy, such as environmental monitoring or standards development. Appendix 3B provides further details on the proposed Substances of Concern.

3.0 The "Living List" Process

The Toxics Reduction Act requires that the ministry review the prescribed Toxic Substances and Substances of Concern for possible changes at least every five years to inform decisions regarding additions to and deletions from the regulatory lists as well as to inform the development of voluntary programming and priorities for education and outreach. The ministry anticipates that the review process would also provide an opportunity to align actions under the Strategy with those of other ministry programs. It is proposed that consultation on any proposed changes to the lists would be carried out through the Environmental Registry and stakeholder engagement sessions. Through this process, the public and stakeholders would be able to make recommendations on the addition or removal of substances.

Nomination/Review Process

To keep prescribed Toxics Substances (and Substances of Concern) up to date and relevant with respect to the current scientific information, the ministry is proposing to consider sources of information from a number of programs including:

- International Protocols (e.g., Stockholm convention);
- European programs – Registration Evaluation Authorization of Chemicals (REACH);
- United States programs – Chemical Assessment and Management Program (CHAMP);
- Federal programs – CMP;
- Great Lakes (GL) programs – GLBTS (Great Lakes Binational Toxics Strategy), Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem; and
- Provincial programs.
  - Standards development programs – e.g., regulatory air standards and drinking water quality standards (DWQS), non-regulatory provincial water quality objectives (PWQOs);
  - Provincial approvals programs – Ground-Level Concentration (GLC) database; contaminated sites issues (Brownfields); and
  - Compliance and enforcement issues – Sector Compliance Branch priorities; operations division issues.

Additionally, the ministry is proposing to consider information from the following:

- Peer-reviewed literature;
- Proceedings of scientific meetings;
- Environmental monitoring and surveillance data;
- Biomonitoring; and
- Non-government organization or industry reports.

Screening Criteria

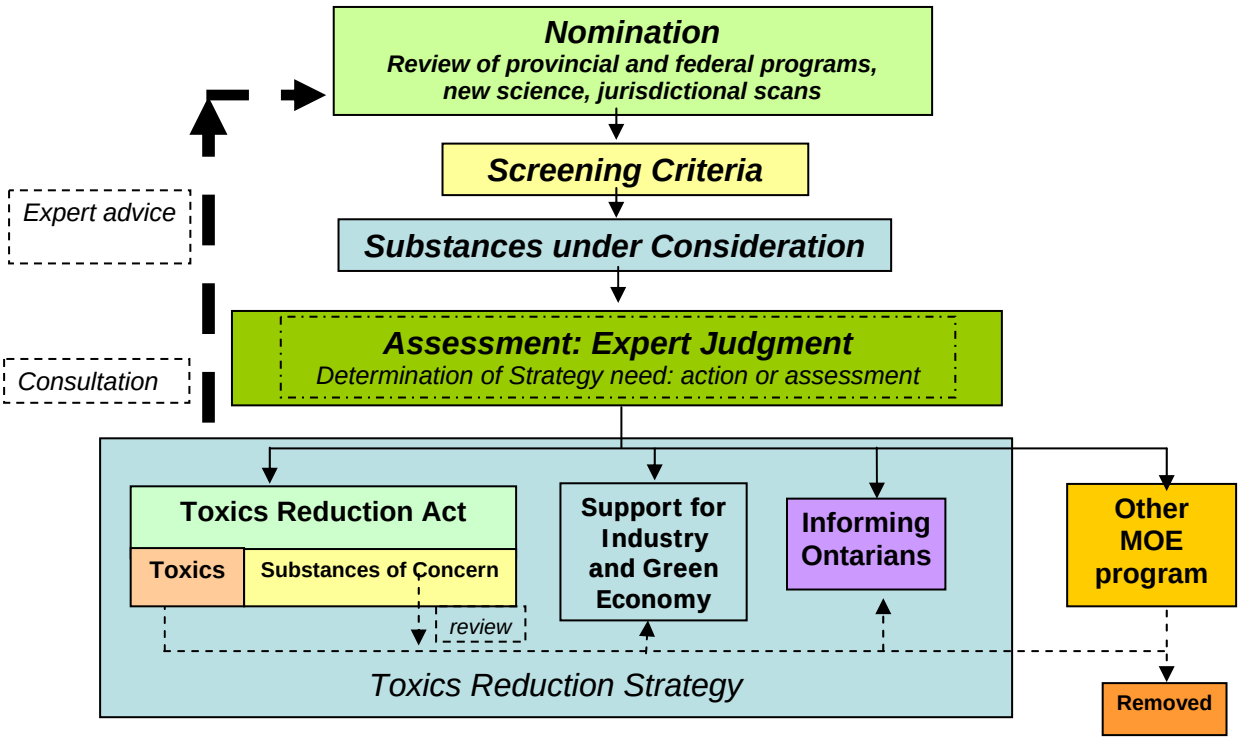
The ministry proposes to work collaboratively with other government agencies and in consultation with scientific experts (from academia, industry and non-government organizations) to develop and assess screening criteria that will be considered in reviewing the lists for regulation. To date the ministry has applied criteria from the DSL categorization exercise but may choose to apply more stringent or additional criteria after consideration of Strategy needs.

Assessment / Expert Judgement

Once candidate substances are screened through defined criteria, the ministry may need to develop a short list based on additional considerations such as feasibility of substitution by safer alternatives / green chemistry opportunities; federal assessment and management actions; prioritization under another ministry program; needs for research and monitoring; and/or known or suspected use and release in Ontario (e.g., industrial chemical use versus domestic use).

Figure 3 provides an overview of the proposed process in developing the "Living List" Process.

Figure 3: Proposed "Living List" Process



Appendix 1

Hazard Ranking Systems

Appendix 1A: Risk Screening Environmental Indicators (RSEI) Model

The Risk Screening Environmental Indicators (RSEI) model is a computer-based screening tool developed by the United States Environmental Protection Act that is used for trend analysis or ranking industries, chemicals or facilities (based on Toxics Release Inventory – TRI chemicals). The model analyzes factors (the amount of toxic chemical released, the degree of toxicity, and the size of the exposed population) that may result in chronic human health risks. The RSEI model then analyzes these factors and calculates a numeric score (hazard score) for each substance.

The type of information that is considered in calculating the scores includes the:

- amount of a chemical released;
- location of the release;
- toxicity of the chemical;
- fate and transport through the environment and,
- route and extent of human exposure, number of people affected and both cancer and non-cancer human health end-points (based on single, most sensitive chronic-health endpoint for inhalation or oral exposure).

The model does not consider acute human toxicity or environmental toxicity.

Some of the strengths to using the RSEI model are that it:

- provides important hazard-based and risk-based perspectives regarding the impacts of releases;
- can model any chemical (if toxicity characteristics, physical chemical properties are available) and,
- considers chronic human toxicity (both cancer and non-cancer end-points).

Some of the limitations to the model are that it does not provide scores for all substances, some direct exposure pathways and acute health effects are not considered (dermal and food ingestion pathways (other than fish consumption)) and ecological effects are not addressed. More information can be found at http://www.epa.gov/oppt/rsei/.

Appendix 1B: Scoring and Ranking System for Persistent, Bioaccumulative, and Toxic substances for the North American Great Lakes (SCRAM)

SCRAM is a risk-screening tool that is intended to provide relative rankings of 140, chemicals as an initial step in a risk screening process based on the chemicals characteristics of persistence, bioaccumulation and toxicity. The tool was developed jointly by the Michigan Department of Environmental Quality, Surface Water Quality Division (SWQD), and Michigan State University, National Food Safety and Toxicology Centre.

The tool emphasizes the environmental fate properties of a chemical by weighting the scores for persistence, bioaccumulation and toxicity. Chemicals must have at least one data point for persistence, bioaccumulation and toxicity in order to be scored. The data sources from which the tool was developed included the USEPA Aquatic Toxicity Information Retrieval (AQUIRE), ASTER and ECOTOX.

The benefit of using the SCRAM model is that it was developed for the Great Lakes Basin and it considers both human and ecological effects. More information on this process can be found at http://www.usask.ca/toxicology/jgiesy/pdf/publications/JA-309.pdf.

Appendix 2

Priority Toxics Screening

Appendix 2A: Ranking of NPRI (2006) Emissions and Hazard (List A)

	Air Emissions 2006 (Kg)	Air RSEI Score	Water Emissions 2006 (Kg)	Water RSEI Score	SCRAM Score	NPRI Air Rank	NPRI Water Rank	NPRI SCRAM	Total score List A
Arsenic & compounds	31,144	60000	3,739	3000	28	162	163	160	485
Lead & compounds	93,935	8800	8,097	8800	24	159	165	161	485
Manganese & compounds	40,568	36000	158,640	3.6	28	161	157	165	483
Chromium & compounds	7,606	86000	13,342	170	28	158	161	163	482
Copper & compounds	192,770	750	27,554	750	27	153	164	164	481
Nickel & compounds	123,431	20000	13,707	10	27	163	152	162	477
Cadmium & compounds	6,539	90000	1,209	1000	26	157	160	157	474
Phenanthrene	3,109	15000	3	15000	42	145	145	145	435
Benzene	317,123	60	212	130	36	137	142	154	433
Mercury & compounds	853	6000	102	5000	52	120	156	152	428
Selenium & compounds	30,180	90	2,441	100	30	113	154	159	426
Xylene	2,782,159	18	73	2.5	25	147	121	150	418
Cyanides	1,732	600	1,489	100	28	104	153	158	415
Fluoranthene	1,091	15000	1	15000	48	136	139	139	414
Vanadium & compounds	77,047	71	176	71	27	121	136	151	408
Pyrene	596	15000	4	15000	41	127	127	146	400
Benzo(a)pyrene	161	15000	3	15000	33	110	146	143	399
Benzo(a)anthracene	191	15000	1	15000	71	115	141	142	398
Acenaphthene	1,670	15000	0.02	15000	37	139	122	136	397
Toluene	2,293,329	0.36	631	6.3	41	102	131	156	389
Antimony & compounds	161	9000	7	1300	27	107	135	147	389
Ethylbenzene	481,640	1.8	17	5	30	103	118	148	369
Silver & compounds	506	100	25	100	29	79	128	149	356
Tetrachloroethylene	10,512	42	2	50	26	93	119	140	352
Biphenyl	3,239	10	2	10	32	75	116	141	332
Hexachlorobenzene	1	3300	0.114	3200	62	66	123	138	327
Dichloroethane, 1,2-	1	190	4	180	28	57	126	144	327
Chlorine	99,087	9000	165,952	5		160	159		319
Cobalt & compounds	4,086	34000	283		25	152		153	305
Hydrochloric acid	3,229,605	90	1,362	90		154	151		305
Acetaldehyde	217,958	200	1,811	200		144	155		299

	Air Emissions 2006 (Kg)	Air RSEI Score	Water Emissions 2006 (Kg)	Water RSEI Score	SCRAM Score	NPRI Air Rank	NPRI Water Rank	NPRI SCRAM	Total score List A
Hexavalent chromium & compounds	979	86000	248	170		148	144		292
Triethylamine	38,238	260	2,200	260		130	158		288
Formaldehyde	660,370	600	1,498	2.5		155	130		285
Aluminium	344,159	360	8,929	0.5		150	133		283
Zinc & compounds	219,388	51	68,961	1.7		132	150		282
Phenol	156,448		271	1.7	30		124	155	279
PAHs	382	15000	5	15000		122	149		271
Benzo(a)phenanthrene	310	15000	2	15000		119	143		262
Methanol	2,861,287	0.45	80,085	1		106	148		254
Benzo(b)fluoranthene	151	15000	1	15000		109	140		249
Nitric acid	18,177	140	30	140		111	132		243
Benzo(k)fluoranthene	81	15000	1	15000		105	137		242
n-Hexane	1,137,521	2.6	19	8.3		116	120		236
Benzo(g,h,i)perylene	48	15000	0.038	15000		101	125		226
Nitrate ion	1,853	0.31	34,053,076	0.31		59	162		221
Benzo(j)fluoranthene	23	15000	0.094	15000		92	127		219
Vinyl chloride	5,132	63	1	3000		90	129		219
Ethylene glycol	12,259	4.5	57,140	0.25		80	138		218
tert-Butyl alcohol	25,843	5	940	5		83	134		217
Methyl ethyl ketone	1,842,937	0.36	8	0.83		98	115		213
Cyclohexane	513,544	0.3	157	0.3		85	117		202
Sulphuric acid	5,388,238	1800		0.01		165			165
Acrolein	101,457	90000	-	1000		164			164
Chlorine dioxide	58,923	9000	-	17		156			156
Trimethylbenzene, 1,2,4-	461,509	300	-	1000		151			151
Ammonia (total)	6,243,271	18	18,636,165			149			149
Hydrogen fluoride	383,699	130	-	13		146			146
Butadiene, 1,3-	42,526	900	-	900		143			143
p,p'-Methylene*bis*(2-chloroaniline)	11,758	3100	-	200		142			142
Naphthalene	54,172	600	-	25	25	141			141
Dicyclopentadiene	3,092	9000	-	17		140			140
Maleic anhydride	7,433	2600	-	5		138			138
Fluorene	-	15000	0.032	15000	44		124	137	137

Appendix 2

	Air Emissions 2006 (Kg)	Air RSEI Score	Water Emissions 2006 (Kg)	Water RSEI Score	SCRAM Score	NPRI Air Rank	NPRI Water Rank	NPRI SCRAM	Total score List A
Diethanolamine	23,808	600	-	360		135			135
Dioxins and furans	-		0.00001		49			135	135
Toluene diisocyanate	501	26000	-	78		134			134
Molybdenum trioxide	1,567	7500	-	190		133			133
Hydrogen cyanide	18,606	600	-	25		131			131
Acenaphthylene	639	15000		15000		129			129
Dibenzo(a,i)pyrene	611	15000	-	15000		128			128
Ethylene oxide	12,325	630	-	440		126			126
Acrylamide	800	9300	-	9000		125			125
Trichloroethylene	504,476	14	-	14	38	124			124
Methylene*bis*(phenylisocyanate)	1,932	3000	-	3000		123			123
Chloromethane	199,000	20	-	2.6		118			118
n-Butyl alcohol	591,960	5	-	5		117			117
Carbonyl sulphide	18,678	150	-	150		114			114
Quinoline	426	6000	-	6000		112			112
Dibenzo(ah)anthracene	105	15000	-	15000	70	108			108
Styrene	394,620	1.8	-	2.5	41	100			100
i-Butyl alcohol	136,632	5	-	5		99			99
Carbon disulphide	249,296	2.6	-	5	38	97			97
Acetonitrile	18,994	30	-	30		96			96
Perylene	38	15000		15000		95			95
Butyl acrylate	289	1800	-	1		94			94
Dichloromethane	102,141	3.4	-	15	26	91			91
Propylene	361,811	0.6	-	0.6		89			89
Thorium dioxide	104	1800	-	1000000		88			88
N,N-Dimethylformamide	2,738	60	-	5		87			87
Methyl isobutyl ketone	272,826	0.6	-	6.3		86			86
Ethylene	488,277	0.29	-	0.29		84			84
Sodium nitrite	25,408	5	-	5		82			82
Toluene-2,4-diisocyanate	3	26000	-	78		81			81
Methyl methacrylate	17,174	2.6	-	0.36		78			78
Vinyl acetate	4,414	9	-	0.5		77			77
sec-Butyl alcohol	7,708	5	-	5		76			76

Appendix 2

	Air Emissions 2006 (Kg)	Air RSEI Score	Water Emissions 2006 (Kg)	Water RSEI Score	SCRAM Score	NPRI Air Rank	NPRI Water Rank	NPRI SCRAM	Total score List A
Diphenylamine	1,267	20	-	20		74			74
Cresol	5,534	3	-	10		73			73
Formic acid	65,809	0.25	-	0.25		72			72
dichlorobenzene (p-dichlorobenzene), 1,4-	1,758	7.9		71		71			71
Dibenz(a,j)acridine	1	15000	-	15000		70			70
Trichlorobenzene, 1,2,4-	856	9	-	50	46	69			69
Cumene	1,496	4.5	-	5		68			68
Decabromodiphenyl oxide	48	71	-	71		67			67
Methyl *tert*-butyl ether	4,259	0.6	-	0.6		65			65
Propylene oxide	40	60	-	480		64			64
Ethyl acrylate	46	38	-	96		63			63
p,p'-Isopropylidenediphenol/ Phenol, 4,4 -(1-methylethylidene)bis-	159	10	-	10		62			62
Fluorine	93	8.3	-	8.3		61			61
Anthracene	354	1.7	-	1.7	54	60			60
Bromomethane	1	360	-	25		58			58
Chloroform	1	160	0	50	27	56			56
Carbon tetrachloride	1	110	-	710	30	55			55

Appendix 2

Appendix 2B: Substances Identified under Ministry Programs (List B)

Nominated Substances	List B
Copper & compounds	X
Xylene	X
Cadmium & compounds	X
Toluene	X
Ethylbenzene	X
Nickel & compounds	X
Lead & compounds	X
Selenium & compounds	X
Vanadium & compounds	X
Chromium & compounds	X
Mercury& compounds	X
Zinc & compounds	X
Vinyl chloride	X
Tetrachloroethylene	X
Silver & compounds	X
Cobalt & compounds	X
PAHs	X
Benzene	X
Hexachlorobenzene	X
Antimony	X
Trichloroethylene	X
1,3 butadiene	X
Toluene diisocyanate	X
Toluene-2,4-diisocyanate	X
Chloroform	X

Appendix 2C: Jurisdictional Scan (List C)

Ministry staff carried out a jurisdictional scan to identify and review 27 various substance / toxic programs (or lists) for bans, risk management, reviews, reporting, or biomonitoring. Professional judgment was used to score each program (list) from 1-5 based on the aggressiveness, goal of the program and the criteria on which it was based. For example, lists of substances for virtual elimination or aggressive controls were scored as 5, as were lists of known carcinogens. Lists of substances for pollution prevention and risk management received a score of 4 as did probable carcinogens. Possible carcinogens were scored as 3; whereas lists of substances that required reporting were ranked as 2 and literature reviews were ranked as 1. Table 2C(i) lists the 27 programs and the corresponding scores applied by the ministry.

Table 2C(i): List of programs reviewed and corresponding ranking

	Program or List	Ranking
1	The Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem (1994). Tier 1 substances.	**5**
1	Great Lakes Binational Toxics Strategy (GLBTS Level 1).	**5**
2	The Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem (1994). Tier II substances.	**4**
3	Great Lakes Binational Toxics Strategy (GLBTS Level II).	**4**
4	Ministry of the Environment (Bans and Phase-outs).	**5**
5	Stockholm convention on persistent organic pollutants (POPs).	**5**
6	Hazardous Products Act - Consumer Chemicals and Containers Regulations (CCCR 2000).	**5**
7	United States Environmental Protection Agency: *Clean Water Act*, Priority Pollutants 40 CFR part 423.	**5**
8	The International Agency for Research on Cancer (IARC). (known = 5, probable = 4, possible = 3)	**5, 4, 3**
9	National Toxicology Program (NTP). The Report on Carcinogens, Eleventh Edition (known = 5, reasonably anticipated = 4)	**5, 4**
10	National Environmental Policy Plan – Netherlands.	**4**
11	*Canadian Environmental Protection Act,* 1999. List of Toxic substances (Schedule 1).	**4**
12	Ontario Ministry of the Environment's Municipal Industrial Strategy for Abatement (MISA) program.	**4**
13	Ontario Ministry of the Environment's Environmental Penalties – Code of Toxic Substances (as referred to in O.Reg. 222/07 and O.Reg. 223/07).	**4**
14	Environment Canada/ Health Canada Chemicals management Plan challenge to industry. Domestic Substances List high priority substances.	**4**
15	Massachusetts Toxics Reduction Act (TURA).	**4**
16	Toronto's Public Health: Environmental Reporting and Disclosure by-law.	**4**

	Program or List	Ranking
17	Washington State Department of Ecology. Persistent, Bioaccumulative and Toxic Chemical Action Plan.	**4**
18	State of Maine, Department of Environmental Protection, Bureau of Air Quality (Maine Air Toxics Initiative).	**4**
19	Article I. Finnish Environment Institute (SYKEmo239 Selection of hazardous substances for the risk management).	**4**
20	A scoring and Ranking system for Persistent, Bioaccumulative and Toxic Substances for the North American Great Lakes - Resulting chemical Scores and Ranking (SCRAM).	**4**
21	United States Environmental Protection Agency, Priority Pollutants Clean Water Act – Contaminant Criteria List 3.	**4**
22	The State of California's *Safe Drinking Water and Toxic Enforcement Act*, 1986 (known as Proposition 65).	**4**
23	Centre for the Evaluation of risks to Human Reproduction (CERHR), National Toxicology Program.	**3**
24	National Pollutant Release Inventory (Environment Canada).	**2**
25	Toxic Nation, Environment Defence.	**1**
26	Chemicals of Concern in Ontario: Emerging Contaminant Issues (2007) McMaster University.	**1**
27	CELA's (Canadian Environmental Law Association) Children's Health and the Environment.	**1**

This review identified just over 1500 substances of which the top 10% were selected based on their occurrence on priority lists. The top ranking substances are listed below.

Table 2C(ii) Program Scan of Substances: Top 10% Ranking Chemicals

Substance – List C	Chemical Abstract Service Number (CASN)
Cadmium & compounds	7440-43-9
Dioxins and Furans	many congeners
Dichlorobenzene (p-dichlorobenzene), 1,4-	106-46-7
Hexachlorobenzene (HCB)	118-74-1
Lead and compounds	7439-92-1
PCBs	1336-36-3
Benzene	71-43-2
Arsenic (Inorganic arsenic)	7440-38-2
Mercury & compounds	7439-97-6

Substance – List C	Chemical Abstract Service Number (CASN)
Carbon tetrachloride	56-23-5
Toxaphene	8001-35-2
Dichloroethane, 1,2- Ethylene Dichloride	107-06-2
Nickel & compounds	7440-02-0
Benzo(a)anthracene	56-55-3
Benzo(a)pyrene	50-32-8
Heptachlor + Heptachlor epoxide	76-44-8
Chloroform or trichloromethane	67-66-3
Hexavalent chromium	18540-29-9
DDT/DDD/DDE	
Tetrachloroethylene or perchloroethylene	127-18-4
Trichloroethylene (TCE)	79-01-6
Dichloromethane or Methylene Chloride	75-09-2
Aldrin/dieldrin	na
Pentachlorophenol	87-86-5
Vinyl chloride	75-01-4
Acrylonitrile	107-13-1
Chlordane	57-74-9
Formaldehyde or methanal	50-00-0
Mirex	2385-85-5
Butadiene, 1,3-	106-99-0
Hexachlorocyclohexane, (gamma isomer or Lindane gamma	58-89-9
Naphthalene	91-20-3
Ethylene dibromide or Dibromoethane	106-93-4
Hexachloro-1,3-butadiene	87-68-3
Beryllium and compounds	7440-41-7
Phenanthrene	85-01-8
Benzidine (including benzidine based dyes)	92-87-5
Chromium	*
Dibenzo(ah)anthracene	53-70-3
Nitrobenzene	98-95-3
Benzo(b)fluoranthene	205-99-2
Bis(2-ethylhexyl) phthalate	117-81-7
Hexachloroethane	67-72-1
Indeno(1,2,3-c,d)pyrene	193-39-5
Dichlorobenzidine-3,3'	91-94-1
Hydrazine	302-01-2
Acrolein	107-02-8
Anthracene	120-12-7
Benzo(g,h,i)perylene	191-24-2
Endrin	72-20-8
Ethylene oxide	75-21-8
Acetaldehyde	75-07-0
Bromomethane or methyl bromide	74-83-9
Benzo(k)fluoranthene	207-08-9

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Substance – List C	Chemical Abstract Service Number (CASN)
Hexachlorocyclohexane (alhpha isomer) or lindane	319-84-6
N-Nitrosodimethylamine (d) NDMA	62-75-9
Propylene oxide	75-56-9
Asbestos	1332-21-4
Toluene aka methyl benzene	108-88-3
Trichlorophenol, 2,4,6-	88-06-2
Chloromethane	74-87-3
Pentachlorobenzene	608-93-5
Tetrachloroethane, 1,1,2,2,-	79-34-5
Benzene, (chloromethyl)-	100-44-7
bis(Chloromethyl) ether	542-88-1
Butyl benzyl phthalate	85-68-7
Chloromethyl oxirane (aka epichlorohydrin)	106-89-8
Cobalt	7440-48-4
Cyanide (total, as HCN)	57-12-5
Phenol	108-95-2
Trichlorobenzene, 1,2,4-	120-82-1
Bromodichloromethane	75-27-4
Chrysene	218-01-9
Dinitrotoluene, 2,4-	121-14-2
Dinitrotoluene, 2,6-	606-20-2
Dioxane, 1,4-	123-91-1
Methylenebis(2-chloroaniline), 4,4'-	101-14-4
Sulfuric acid, diethyl ester or Diethylsulfate	64-67-5
Acrylamide or 2-Propenamide	79-06-1
Dichloroethane, 1,1-	75-34-3
PAHs	
Trifluralin or Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-	1582-09-8
Ethylbenzene	100-41-4
N-nitro-di-n-propylamine (NDPA)	621-64-7
Selenium	7782-49-2
Tetrachlorobenzenes	
Chlordecone (aka kepone)	143-50-0
Dibutyl phthalate or Di-n-butyl Phthalate	84-74-2
Dieldrin	60-57-1
Fluoranthene	206-44-0
Nitrofen	1836-75-5
Trichloroethane, 1,1,1-	71-55-6
Ethylene Glycol Monomethyl Ether (EGME) or 2-Methoxyethanol	109-86-4
Styrene	100-42-5
Sulfuric acid, dimethyl ester, dimethyl sulphate	77-78-1
Ethylene thiourea	96-45-7
Nitropropane, 2-	79-46-9
Toluene diisocyanate (aka Benzene, 1,3-diisocyanatomethyl-)	26471-62-5

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Substance – List C	Chemical Abstract Service Number (CASN)
Toluene-2,4-diisocyanate	584-84-9
Tributyl tin	688-73-3
Chlorobenzene	108-90-7
Copper	*
Dichlorobenzene, 1,2- // o-Dichlorobenzene	95-50-1
Dichloropropane, 1,2-	78-87-5
N-Nitrosodiethylamine (NDEA)	55-18-5
o-Toluidine	95-53-4
PBBs	class 07-8
Silver and silver compounds	*
Sulphuric acid (Sulfuric acid)	7664-93-9
Trichloroethane, 1,1,2-	79-00-5
1,2,3-trichloropropane	96-18-4
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Cobalt sulphate (heptahydrate)	10026-24-1
DES or Diethylstilbestrol	56-53-1
Dinitro-*o*-cresol, 4,6-	534-52-1
Dinitropyrene	several congeners
Ethoxyethyl acetate // Ethanol, 2-ethoxy-, acetate, 2-	111-15-9
Fluorene	86-73-7
Hexachlorocyclopentadiene	77-47-4
Manganese	*
N-Nitrosodiphenylamine	86-30-6
Perylene	198-55-0
Phenol, (1,1-dimethylethyl)-4-methoxy- (BHA)	25013-16-5
Pyrene	129-00-0
4-Aminobiphenyl (4-amino-diphenyl) or 4 biphenylamine	92-67-1
Chloromethyl methyl ether (d)	107-30-2
Dibenzo(a,l)pyrene	191-30-0
Di-*n*-octyl phthalate	117-84-0
Endosulfan	115-29-7
2-Naphthylamine	91-59-8
PBDEs	
Thiourea	62-56-6
Benzo(j)fluoranthene	205-82-3
Benzoic trichloride	98-07-7
Bromoform or Tribromomethane	75-25-2
Chlorophenol. 2-	95-57-8
Dibenz(a,j)acridine	224-42-0
Dibenz(a,h)acridine	226-36-8
Dibenzo(a,i)pyrene	189-55-9
Dibenzo(a,h)pyrene	189-64-0
Dibenzo(a,e)pyrene	192-65-4
Dibenzo(c,g)carbazole, 7H-	194-59-2
Dichlorobenzidine dihydrochloride, 3,3'-	612-83-9
Glycine, *N*,*N*-bis(carboxymethyl)- or Nitrilotriacetic acid	139-13-9

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Substance – List C	**Chemical Abstract Service Number (CASN)**
Isoprene	78-79-5
Methylenedianiline-4,4'	101-77-9
Potassium bromate	7758-01-2
Toluene-2,6-diisocyanate	91-08-7
Zinc	7440-66-6
Dichloropropene, 1,3-	542-75-6
Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diaminophenyl) azo][1,1'-biphenyl]-4-yl]azo]-5-hydroxy -6-(phenylazo)-, disodium salt, 2,7- aka Direct Black 38	1937-37-7
Urethane	51-79-6
Urea, *N*'-(3,4-dichlorophenyl)-*N*,*N*-dimethyl-	330-54-1
Vinyl bromide	593-60-2

Appendix 2D: Ranking of Priority Toxics

	NPRI Air x RSEI	NPRI Water x RSEI	NPRI SCRAM	Total score A	List B	Total Score 2	List C	Total Score 3	Rank
Lead & compounds	159	165	161	485	48.5	533.5	106.7	640.2	1
Chromium & compounds	158	161	163	482	48.2	530.2	106.04	636.24	2
Copper & compounds	153	164	164	481	48.1	529.1	105.82	634.92	3
Nickel & compounds	163	152	162	477	47.7	524.7	104.94	629.64	4
Cadmium & compounds	157	160	157	474	47.4	521.4	104.28	625.68	5
Arsenic & compounds	162	163	160	485			97	582	6
Manganese & compounds	161	157	165	483			96.6	579.6	7
Benzene	137	142	154	433	43.3	476.3	95.26	571.56	8
Mercury & compounds	120	156	152	428	42.8	470.8	94.16	564.96	9
Selenium & compounds	113	154	159	426	42.6	468.6	93.72	562.32	10
Toluene	102	131	156	389	38.9	427.9	85.58	513.48	11
Cyanides	104	153	158	415			83	498	12
Ethylbenzene	103	117	148	368	36.8	404.8	80.96	485.76	13
Silver & compounds	79	128	149	356	35.6	391.6	78.32	469.92	14
Tetrachloroethylene	93	118	140	351	35.1	386.1	77.22	463.32	15
Xylene	147	120	150	417	41.7	458.7		458.7	16
Vanadium & compounds	121	136	151	408	40.8	448.8		448.8	17
Hexachlorobenzene	66	122	138	326	32.6	358.6	71.72	430.32	18
Antimony & compounds	107	135	147	389	38.9	427.9		427.9	19
Cobalt & compounds	152		153	305	30.5	335.5	67.1	402.6	20
Dichloroethane, 1,2-	57	126	144	327			65.4	392.4	21
Zinc & compounds	132	150		282	28.2	310.2	62.04	372.24	22
Acetaldehyde	144	155		299			59.8	358.8	23
PAHs	122	149		271	27.1	298.1	59.62	357.72	24
Hexavalent chromium & compounds	148	144		292			58.4	350.4	25
Formaldehyde	155	130		285			57	342	26
Phenol		123	155	278			55.6	333.6	27
Biphenyl	75	115	141	331				331	28
Chlorine	160	159		319				319	29
Hydrochloric acid	154	151		305				305	30
Vinyl chloride	90	129		219	21.9	240.9	48.18	289.08	31
Triethylamine	130	158		288				288	32
Aluminium	150	133		283				283	33
Methanol	106	148		254				254	34

*PAH grouping includes all individual PAH compounds on NPRI.

Appendix 2E: Carcinogens

Substance	Chemical Abstract Service Number (CASN)	Classification
P,p'-methylene*bis*(2-chloroaniline)*	101-14-4	IARC Group 2A
Acrylamide*	79-06-1	IARC Group 2A
Aluminum Production	7429-90-5	IARC Group 1
Arsenic and compounds		IARC Group 1, NTP (known)
Asbestos*	1332-21-4	IARC Group 1, NTP (known)
Benzene	71-43-2	IARC Group 1, NTP (known)
1,3 –Butadiene*	106-99-0	IARC Group 2A, NTP (known)
Cadmium and compounds		IARC Group 1, NTP (known)
Chlorinated toluenes*		
Benzoyl chloride	98-88-4	IARC Group 2A
Benzyl chloride	100-44-7	IARC Group 2A
Creosote*	8001-58-9	IARC Group 2A
Dioxins and Furans*		IARC Group 1, NTP (known)
Epichlorohydrin*	106-89-8	IARC Group 2A
Ethylene Oxide*	75-21-8	IARC Group 1, NTP (known)
Formaldehyde	50-00-0	IARC Group 1
Hexavalent chromium and compounds		IARC Group 1, NTP (known)
Lead and compounds		IARC Group 2A
Nickel and compounds		IARC Group 1, NTP (known)
Styrene Oxide*	96-09-3	IARC Group 2A
Sulfuric Acid and compounds*		
Sulfuric acid	7664-93-9	IARC Group 1, NTP (known)
Dimethyl sulphate	77-78-1	IARC Group 2A
Diethyl sulphate	64-67-5	IARC Group 2A
Tetrachloroethylene	127-18-4	IARC Group 2A
Thorium Dioxide*	1314-20-1	NTP (known)
Trichloroethylene*	79-01-6	IARC Group 2A
Total PAHs**		IARC 1 and Group 2A
Vinyl chloride	75-01-4	IARC Group 1, NTP (known)

* 13 carcinogens added based on their carcinogenicity only.

**Benzo(a)pyrene and Dibenzo(*a,h*)anthracene

IARC: The International Agency for Research on Cancer (IARC).
Group 1 - *The agent (mixture) is carcinogenic to humans.*
Group 2A - The agent (mixture) is probably carcinogenic to humans.

NTP: U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program defines agents as known or reasonably carcinogenic.

Appendix 3

Substances of Concern

Appendix 3A: Substances of Concern Inventories

Ministry experts, in consultation with a subset of the Expert Panel used the following resources to draw potential candidate substances to populate the proposed substances of concern list.

***Cancer and the Environment in Ontario: Gap Analysis on the Reduction of Environmental Carcinogens* (2007)**
http://www.cela.ca/files/uploads/593gap__analysis.pdf

As part of the Cancer and the Environment Stakeholder Group, Cancer Care Ontario released in fall 2007, a list of priority carcinogens for Ontario requiring action. This list has been screened by the Ministry and Expert Panel to retain 174 substances that are known (Group 1) or probable carcinogens (Group 2A) according to the International Agency for Research on Cancer (IARC) or known carcinogens according to the National Toxicology Program (U.S. Department of Health and Human Services, Public Health Service).

Great Lakes Regional Toxic Air Emissions Inventory
http://www.glc.org/air/

The Great Lakes Regional Toxic Air Emissions Inventory is a multi-jurisdictional (8 great lakes states plus Ontario) inventory of point, area and mobile sources of approximately 200 toxic air emissions that have the potential to impact environmental quality in the great lakes region. The inventory represents modelled not measured data.

Proposition 65
www.oehha.org/prop65.html

The State of California's *Safe Drinking Water and Toxic Enforcement Act*, 1986 (known as Proposition 65) is intended to protect California citizens and the State's drinking water sources from chemicals known to cause cancer, birth defects or other reproductive harm, and to inform citizens about exposures to such chemicals. Chemicals on the list (published annually by the Governor) are subject to labeling notification on products.

***Developing analytical methodology for PB&T substances – a systematic process for identification of important chemicals* (Muir and Howard, 2007)**
(unpublished update of 2006 paper: *Environmental Science and Technology*. Volume 40: pp 7157-7166).

The goal of this study was to identify emerging contaminants and persistent, bioaccumulative, and toxic (PBT) chemicals that were not being considered in current Great Lakes contaminant measurement programs and determine how they could be chemically analyzed. The authors screened the USEPA Toxic Substances Control Act

(TSCA) and the Canadian Domestic Substances List (DSL). A total of 600 chemicals were considered for a short list of 50 substances. The short list was considered as part of the screening process for the Ontario substances of concern list.

Appendix 3B: Criteria and Description of the Proposed Substances of Concern

	CAS #	Compound	Group *	P	B	iTaq	Human health priority	GPE	GLC	CMP medium priority
1	37300-23-5	C.I. Pigment Yellow 36	3	P		iT	MOD	GPE	Y	Y
2	68648-87-3	Benzene, C10-16-alkyl derivs.	3		B	iT	MOD	GPE	Y	Y
3	102-71-6	Ethanol, 2,2',2''-nitrilotris-	3	P			MOD	GPE	Y	Y
4	80-43-3	Peroxide, bis(1-methyl-1-phenylethyl)	3	P			MOD	GPE	Y	Y
5	10605-21-7	Carbamic acid, 1H-benzimidazol-2-yl-, methyl ester	3	P		iT	HIGH	LPE	Y	Y
6	25973-55-1	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylpropyl)-	3		B	iT		IPE	Y	Y
7	26761-40-0	Di-isodecyl phthalate (DIDP)	3			iT	MOD	GPE	Y	Y
8	87-68-3	Hexachloro-1,3-butadiene	1	P	B	iT		LPE	Y	
9	1103-38-4	1-Naphthalenesulfonic acid, 2-[(2-hydroxy-1-naphthalenyl)azo]-, barium salt (2:1)	3	P			MOD	GPE	Y	Y
10	5160-02-1	Benzenesulfonic acid, 5-chloro-2-[(2-hydroxy-1-naphthalenyl)azo]-4-methyl-, barium salt (2:1)	3	P			MOD	GPE	Y	Y
11	128-39-2	Phenol, 2,6-bis(1,1-dimethylethyl)-	3		B	iT	MOD	GPE	Y	Y
12	133-49-3	Pentachlorothiophenol	2	P	B	iT			Y	
13	634-66-2	1,2,3,4-Tetrachlorobenzene	2	P	B	iT			Y	
14	75-26-3	2-Bromopropane	1	P		iT	HIGH	LPE	Y	Y
15	119-93-7	3,3'-Dimethylbenzidine	1	P		iT	HIGH	GPE	Y	Y
16	75-34-3	Dichloroethane, 1,1-	1	P		iT	HIGH	GPE	Y	Y
17	119-90-4	3,3'-dimethyoxybenzidine	3			iT	HIGH	LPE	Y	Y
18	19900-65-3	4,4'-methylene bis(o-ethylaniline)	3			iT	HIGH	LPE	Y	Y
19	1330-78-5	tricresyl phosphate	3			iT	MOD	GPE	Y	Y

*Group 1: inventories cited in the ministry's Discussion Paper *(Environment in Ontario: Gap Analysis on the Reduction of Environmental Carcinogens*, the Great Lakes Toxic Air Emissions Inventory and a subset of California's Proposition 65);
*Group 2: Priorities identified by a review of Great Lakes research (Muir and Howard, 2007: *Developing analytical methodology for PB&T substances – a systematic process for identification of important chemicals*); and
*Group 3: substances prioritized through the federal Chemicals Management Plan medium priorities
P: Persistent
B: Bioaccumulative
iTaq: Inherently toxic to aquatic organisms
GPE: Greatest Potential for Exposure
GLC: Ground Level concentration